REMARKS/ARGUMENTS

Claims 13-22 are pending. Claims 13 and 21 have been amended to correct minor informalities. No new matter has been introduced.

Claims 13-19 and 21-22

Claims 13-19, and 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lubbers et al. (U.S. Patent No. 6,947,981) in view of Brewer et al. (U.S. Patent No. 6,876,656). The Examiner recognizes that Lubbers et al. does not disclose when receiving data, a switch transfers the received data to a computer as first data from a first storage device, and cites Brewer et al. for allegedly providing the missing teaching.

Applicants respectfully submit that independent claim 13 is patentable over Lubbers et al. and Brewer et al. because, for instance, they do not teach or suggest that when the switch receives the first read request, if the second storage device has second data that is copy data of the first data, the switch converts the first read request into a second read request for the second data, and transmits the second read request to the second storage device via the network; that if the second storage device does not have the second data, the switch transmits the first read request to the first storage device via the network; and that when receiving the data, the switch transfers the received data to the computer as the first data from the first storage device.

Applicants respectfully submit that independent claim 21 is patentable over Lubbers et al. and Brewer et al. because, for instance, they do not teach or suggest that when the port unit receives the first read request, if the second storage device has second data that is copy data of the first data, the converter converts the first read request into a second read request for the second data, and transmits the second read request to the second storage device through the port unit; that if the second storage device does not have the second data, the switch unit transmits the first read request to the first storage device through the port unit without being converted by the converter; and that when receiving the data, the switch unit transfers the received data to the computer as the first data from the first storage device.

The present invention as claimed discloses a computer that issues a first read request for first data, a switch coupled to the computer via a network, a first storage device coupled to the switch via the network and storing the first data, and a second storage device coupled to the switch via the network and being able to store second data that is copy data of the first data. The switch determines which storage device to fetch the requested data in response to the first read request.

If the second storage device has the second data, the switch converts the first read request into a second read request for the second data, and transmits the second read request to the second storage device via the network. The converting operation which the switch performs involves a conversion of network address, and in many cases involves a conversion of the address of the storage area at which the first data is located. If the second storage does not have the second data, the switch transmits the first read request to the first storage device via the network, with the request unchanged.

In the claimed invention, the switch performs the conversion of the first read request when the second storage device has the copy data of the first data stored in the first storage device, while the switch does not perform the conversion when the second storage device does not have the copy data. Both Lubbers et al. and Brewer et al. fail to disclose or suggest this feature.

Lubbers et al. discloses an architecture for flexible data replication management comprising host computers, storage cells, and switches interconnected on a storage area network. Each storage cell comprises a storage controller and a pool of storage devices accessible through the controller. Each storage cell is able to function as a primary storage location for any host, and at the same time function as a secondary or alternative storage location for a replica of data from another storage cell. See Abstract, Figs. 1 and 2, and column 6, lines 51-56. Lubbers' switches are connected to each other over an expansion port, where a single switch can fail and the system can still continue access on the storage area network. See column 7, lines 48-67, Fig. 3 (301). The host computer accesses the storage devices through a data form of logical units (LUNs) (col. 5,lines 40-42). Because each LUN is identified by a worldwide LUN ID (WWLID), all the LUNs are transparent to a host computer regarding whether they reside on a primary storage location or on an

alternative storage location as copied data (col. 5, lines 63 to col. 6, line 9). That is, each LUN in a copy set is presented to the host computer using the same WWLID as the LUN in an original (col. 10, lines 36-41).

Lubbers' switch is nothing more than a conventional switch. Lubbers is completely devoid of any teaching that the switch can be configured to decide whether to direct a read request from a host to a first storage cell or to a second storage cell. *Lubbers' switch has nothing to do with a technique for directing a read request which the switch of present invention features.*

Moreover, Lubbers' read request originating from a host computer is sent to the first or second storage cell without being intervened by a storage selection mechanism performed by a switch, and the first or second storage cell handles the read request irrespective of whether the second storage cell has a second data. See column 8, lines 27-30. While Lubbers' storage controller converts a designated logical unit to its physical storage area (see column 5, line 67 to column 6, line 4), this is not equivalent to converting the read request into another when a switch has found a copy of the requested data in a local storage.

The Examiner has cited column 10, lines 40-45, column 6, lines 50-55, and column 7, lines 20-35 as showing the switch determining the destination of a received read request. However, the cited passage merely teaches that the system of Lubbers has a primary storage location and an alternative storage location for a replica of data; when a single component fails at a site, the system will use a redundant component at the site to allow continued operation. *While the logical units (LUN) can be presented to the hosts with the same ID, the WWLID is not equivalent to and is not related to a read request identifier.* Therefore, the switch of Lubbers is not the same as the switch of the claimed invention.

Brewer et al. is directed to a storage virtualization technique, in which a storage manager and a switch intervene between clients and storage devices. Brewer et al. discloses a switch to intercept write transaction write data and transfer ready frames from a storage device to a storage manager and re-label and direct them directly to a requesting client to bypass the storage manager or other bottlenecks. See Abstract; and column 10, lines 29-36. For a read request issued by a client, the client becomes an originator and the storage manager becomes a responder. The storage manager then becomes an originator and a

storage device becomes a responder to deliver the read request to the storage device. The switch performs processes for relabelling and redirecting the read request bypassing the storage manager. See column 10, lines 36-43; lines 47-51; and column 12, lines 23-35.

While Brewer's switch redirects a read request when viewed from a client or a storage device, Brewer's switch does not change the destination of a read request from a first storage device to a second storage device, as performed by the switch of the present invention. Therefore, Brewer et al. does not cure the deficiencies of Lubbers et al.

For at least the foregoing reasons, claims 13 and 21, and claims 14-19 and 22 depending therefrom, are patentable.

Claim 20

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Lubbers et al. and Brewer et al. further in view of Coile et al. (U.S. Patent No. 6,654,795). The Examiner recognizes that Lubbers et al. and Brewer et al. do not disclose that the switch chooses a storage area occupied by data with the least frequency of use by the computer from among all of a second data in a second storage device, and cites Coile et al. for allegedly providing the missing teaching.

Applicants note that Coile does not cure the deficiencies of Lubbers et al. and Brewer et al., in that Coile also fails to teach or suggest that the switch receives a first read request for the first data from the computer via the network, if the second storage device has second data that is copy data of the first data, the switch converts the first read request into a second read request for the second data, and transmits the read request to the second storage device via the network, that if the second storage device does not have the second data, the switch transmits the first read request to the first storage device via the network; and that when receiving the data, the switch transfers the received data to the computer as the first data from the first storage device, as recited in claim 13 from which claim 20 depends.

As discussed above, Lubbers' switch is a conventional switch. Lubbers et al. does not disclose that the switch converts the read request into another when the switch has found a copy of the requested data in its local storage. Brewer et al. discloses a switch that redirects a read request when viewed from a client or a storage device, it does not mention or

suggest changing the destination of a read request from a first storage device to a second storage device. The switch taught in Lubbers or Brewer does not correspond to the switch in the present invention because a read request does not undergo a change to its destination address when the requested data has been found in the second storage device.

Although Coile discloses determining a current usage level of a storage device system, wherein the storage device system with the lowest current usage level is selected (see column 7, lines 22-25), Coile does not mention or suggest changing the destination of a read request from a first storage device to a second storage device.

For at least the foregoing reasons, claim 20 is patentable.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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